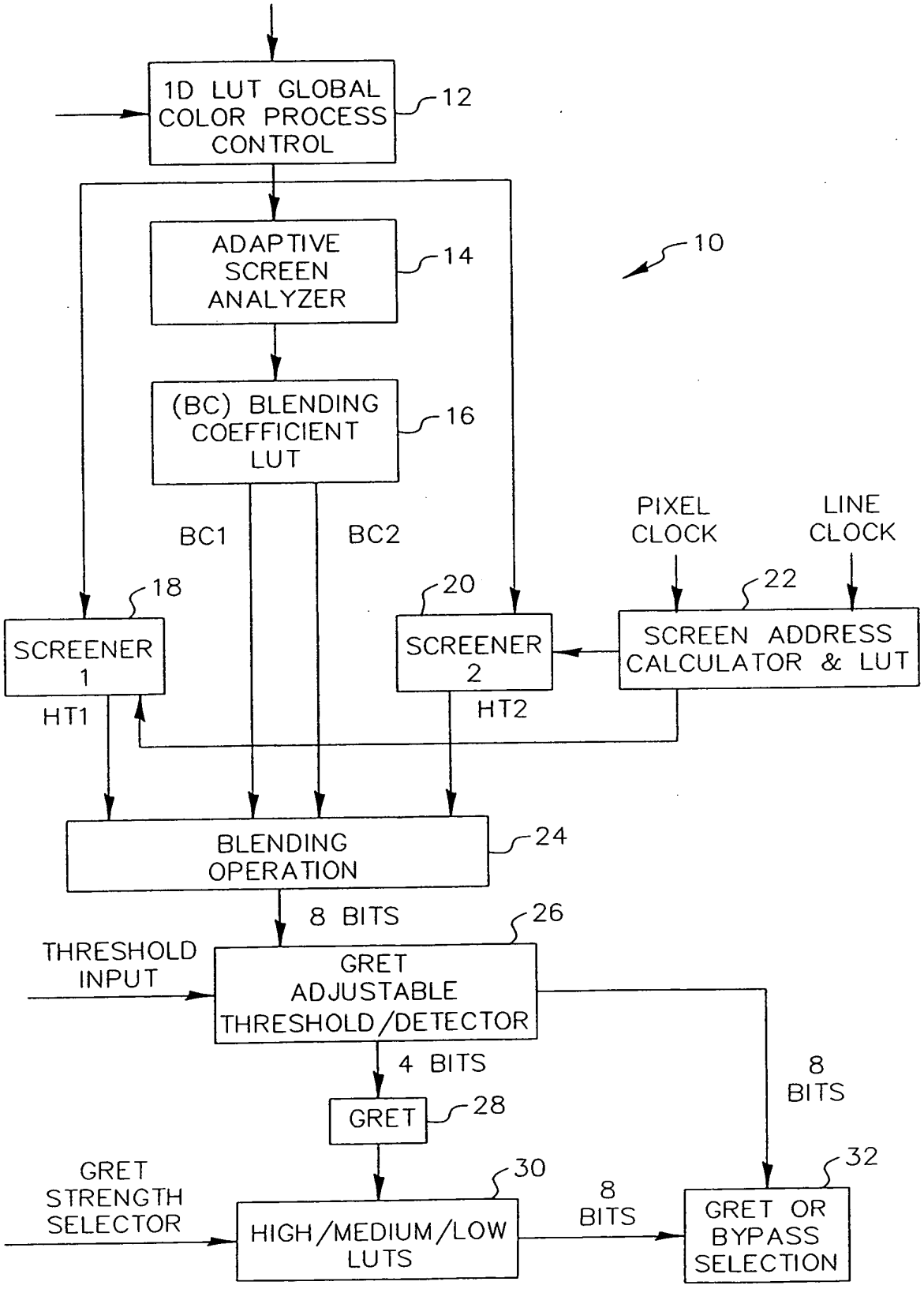

1D LUT GLOBAL COLOR PROCESS CONTROL
12
ADAPTIVE SCREEN ANALYZER
14
10
(BC) BLENDING COEFFICIENT LUT
16
BC1
BC2
PIXEL CLOCK
LINE CLOCK
18
20
22
SCREENER 1
SCREENER 2
SCREEN ADDRESS CALCULATOR & LUT
HT1
HT2
BLENDING OPERATION
24
8 BITS
26
THRESHOLD INPUT
GRET ADJUSTABLE THRESHOLD/DETECTOR
4 BITS
8 BITS
GRET
28
GRET STRENGTH SELECTOR
30
32
HIGH/MEDIUM/LOW LUTS
8 BITS
GRET OR BYPASS SELECTION

FIG. 1

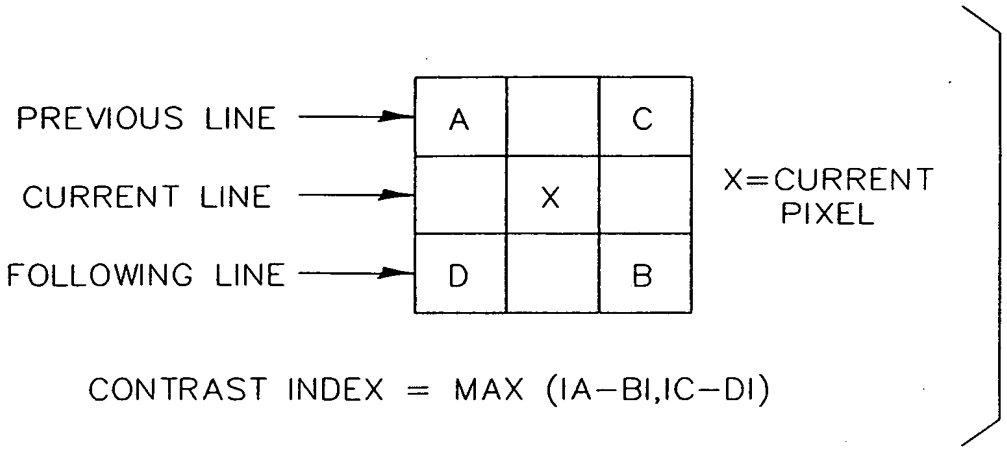

PREVIOUS LINE
CURRENT LINE
FOLLOWING LINE
A
C
X
D
B
X=CURRENT PIXEL
CONTRAST INDEX = MAX (IA−BI,IC−DI)

FIG. 2

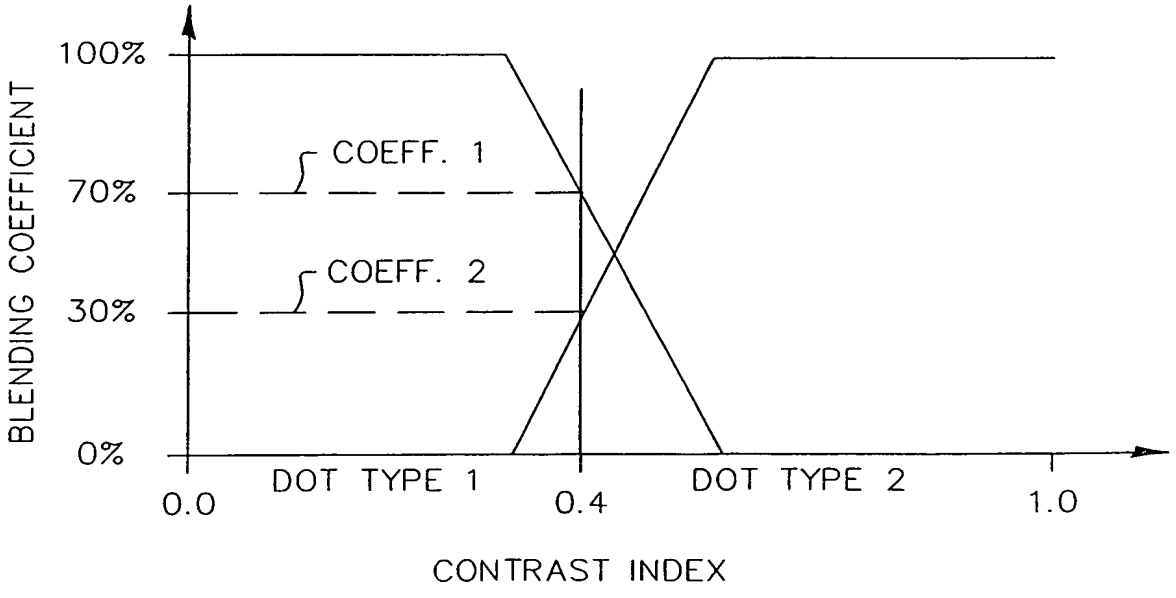

100%
70%
30%
0%
COEFF. 1
COEFF. 2
BLENDING COEFFICIENT
DOT TYPE 1
DOT TYPE 2
0.0
0.4
1.0
CONTRAST INDEX

FIG. 3

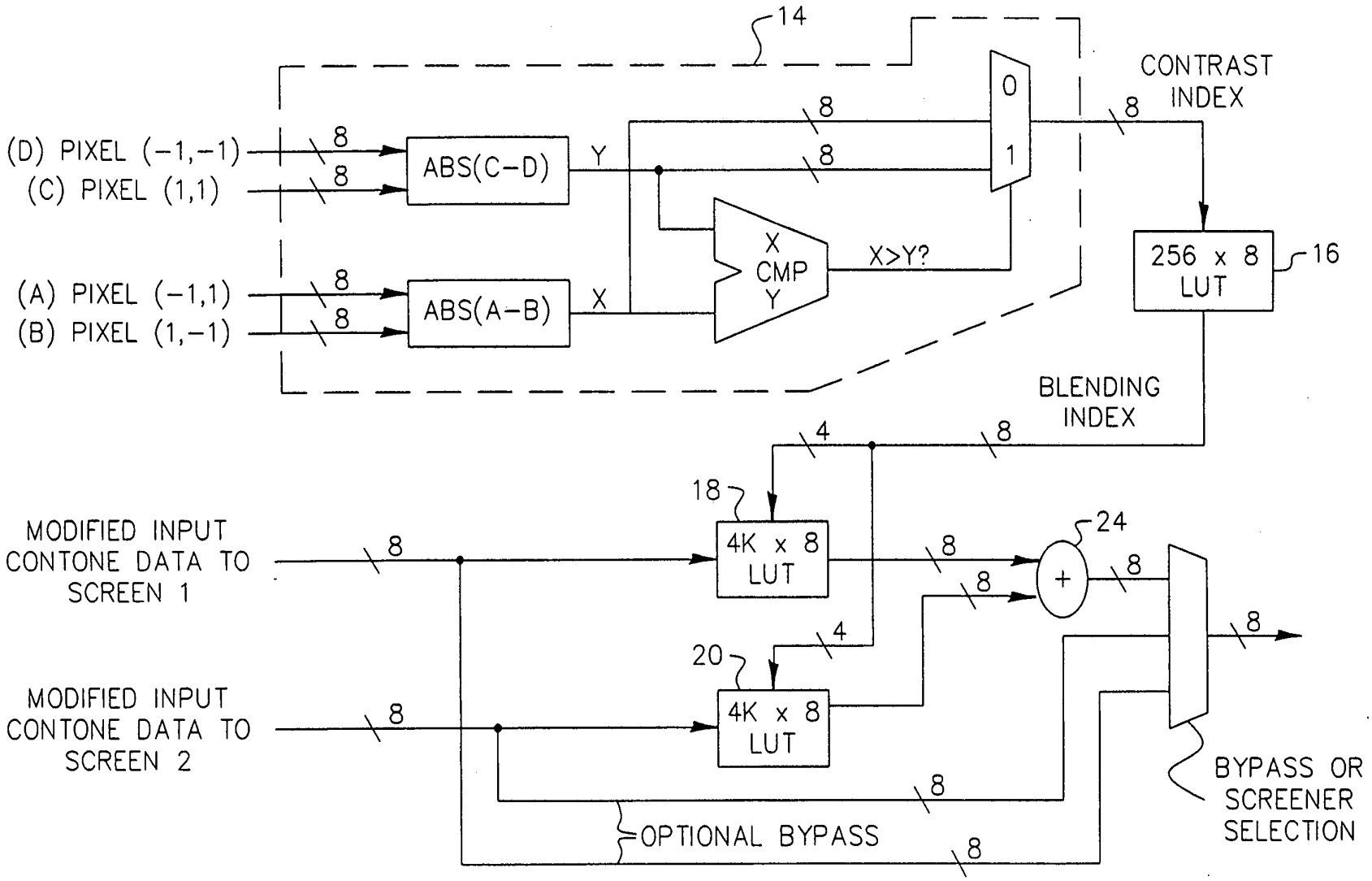

14
(D) PIXEL (−1,−1)
(C) PIXEL (1,1)
(A) PIXEL (−1,1)
(B) PIXEL (1,−1)
8
ABS(C−D)
ABS(A−B)
Y
X
X
CMP
Y
X>Y?
0
1
CONTRAST
INDEX
256 x 8
LUT
16
BLENDING
INDEX
4
18
MODIFIED INPUT
CONTONE DATA TO
SCREEN 1
4K x 8
LUT
24
+
20
MODIFIED INPUT
CONTONE DATA TO
SCREEN 2
BYPASS OR
SCREENER
SELECTION
OPTIONAL BYPASS

FIG. 4

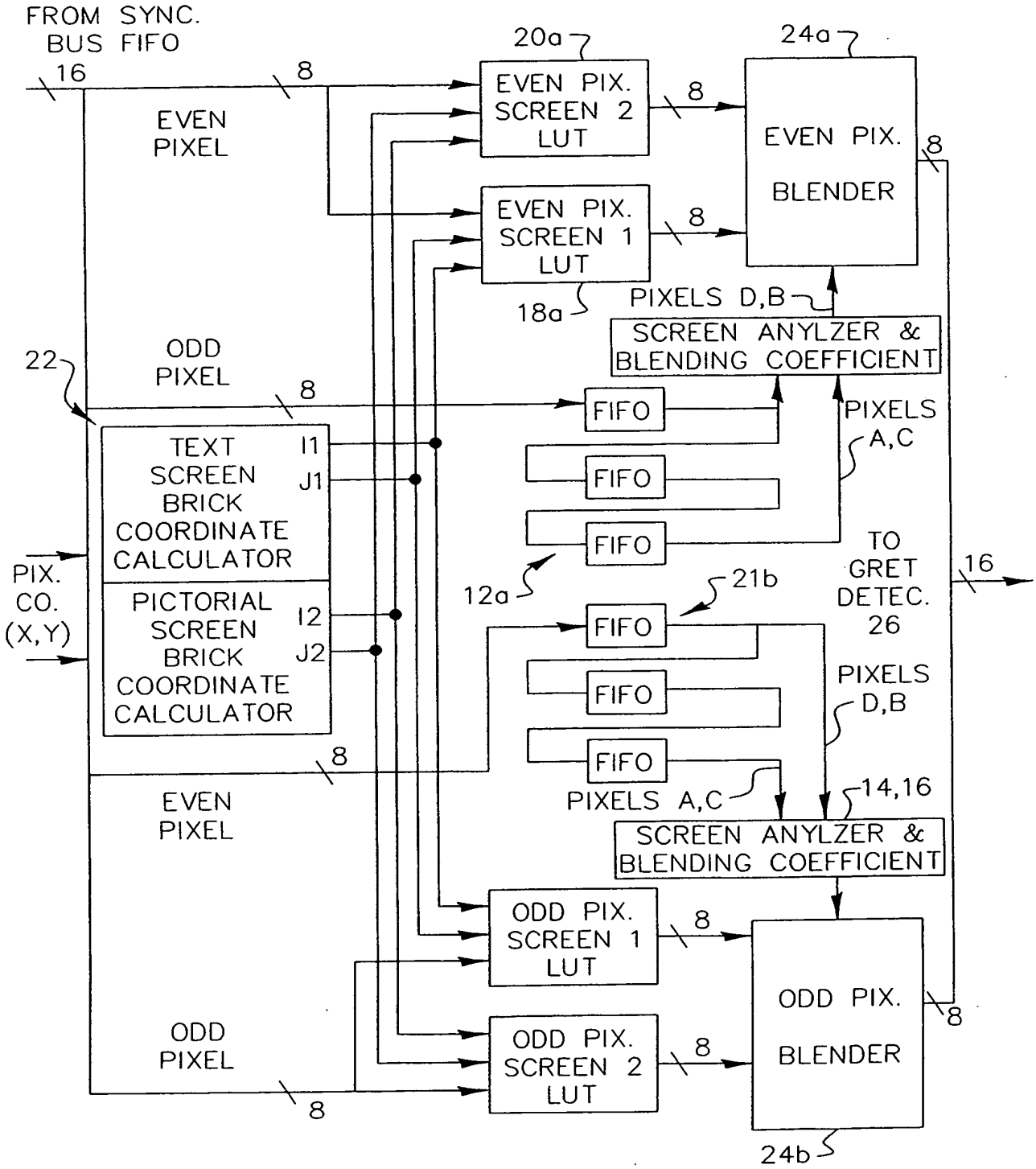

FROM SYNC. BUS FIFO
16
8
EVEN PIXEL
20a
EVEN PIX. SCREEN 2 LUT
8
24a
EVEN PIX. BLENDER
8
EVEN PIX. SCREEN 1 LUT
8
18a
PIXELS D,B
SCREEN ANYLZER & BLENDING COEFFICIENT
22
ODD PIXEL
8
FIFO
FIFO
FIFO
PIXELS A,C
TEXT SCREEN BRICK COORDINATE CALCULATOR
I1
J1
PICTORIAL SCREEN BRICK COORDINATE CALCULATOR
I2
J2
PIX. CO. (X,Y)
12a
21b
FIFO
FIFO
FIFO
TO GRET DETEC. 26
16
PIXELS D,B
PIXELS A,C
14,16
8
EVEN PIXEL
SCREEN ANYLZER & BLENDING COEFFICIENT
ODD PIX. SCREEN 1 LUT
8
ODD PIX. BLENDER
8
ODD PIX. SCREEN 2 LUT
8
ODD PIXEL
8
24b

FIG. 5

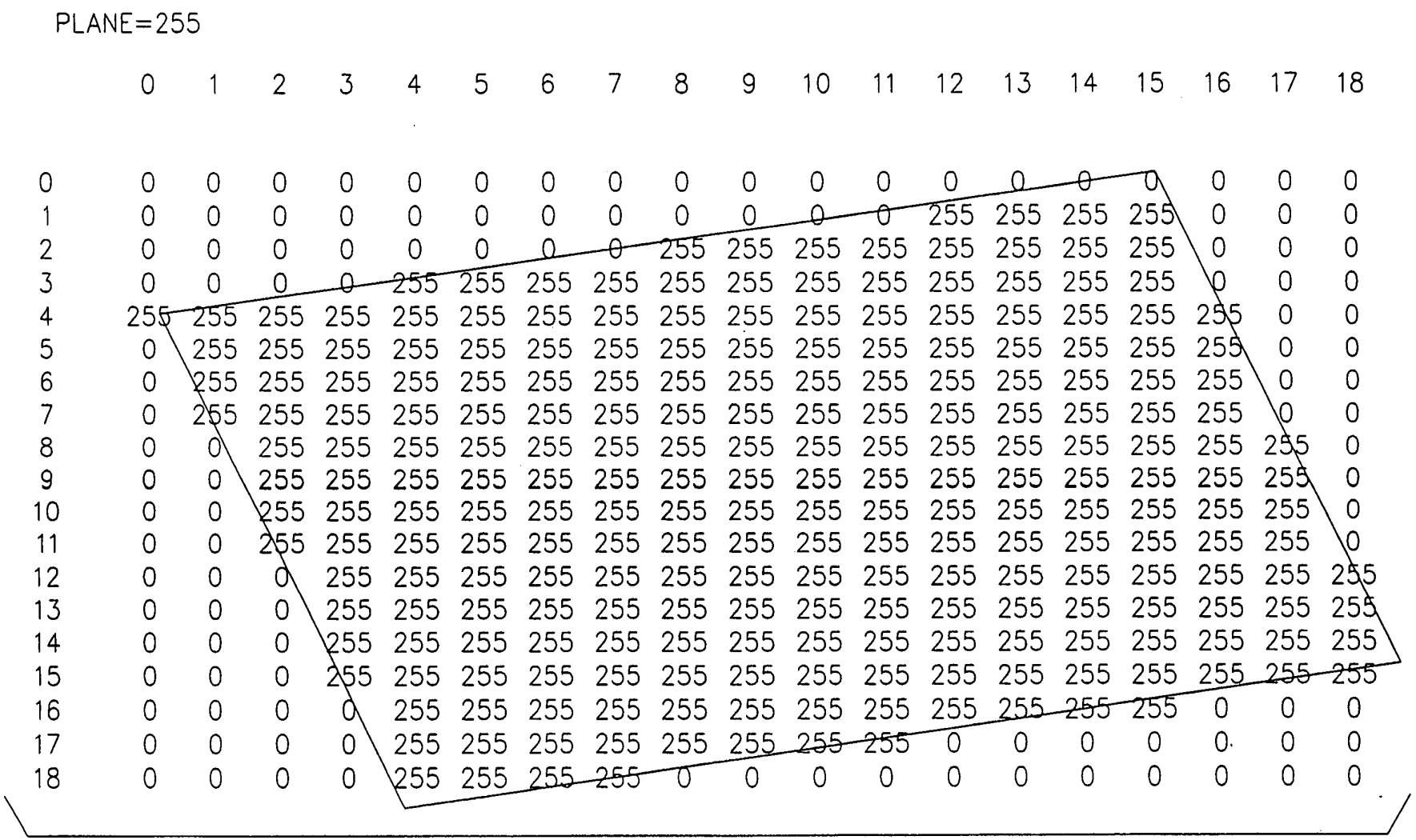

PLANE=255
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0 0 0 0 255 255 255 255 0 0 0
2 0 0 0 0 0 0 0 0 255 255 255 255 255 255 255 255 0 0 0
3 0 0 0 0 255 255 255 255 255 255 255 255 255 255 255 255 0 0 0
4 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0 0
5 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0 0
6 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0 0
7 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0 0
8 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0
9 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0
10 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0
11 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0
12 0 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
13 0 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
14 0 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
15 0 0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
16 0 0 0 0 255 255 255 255 255 255 255 255 255 255 255 255 0 0 0
17 0 0 0 0 255 255 255 255 255 255 255 255 0 0 0 0 0 0 0
18 0 0 0 0 255 255 255 255 0 0 0 0 0 0 0 0 0 0 0

FIG. 6a

PLANE=128

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	9	166	117	32	0	0	0
2	0	0	0	0	0	0	0	0	0	120	155	40	77	233	248	187	0	0	0
3	0	0	0	0	0	70	182	57	48	204	253	209	156	219	241	83	0	0	0
4	0	32	187	83	32	163	253	228	155	202	248	132	0	54	168	32	0	0	0
5	0	117	248	241	168	182	243	181	22	27	152	70	0	13	182	163	70	0	0
6	0	166	233	219	54	13	117	116	0	0	134	194	81	117	243	253	182	0	0
7	0	0	86	156	0	0	81	212	104	86	225	255	212	116	181	228	57	0	0
8	0	0	40	209	132	70	194	255	235	126	157	235	104	0	22	155	48	0	0
9	0	0	155	253	248	152	134	225	164	0	0	133	86	0	27	202	204	120	0
10	0	0	120	204	202	27	0	86	133	0	0	164	225	134	152	248	253	155	0
11	0	0	0	48	155	22	0	104	235	157	126	235	255	194	70	132	209	40	0
12	0	0	0	57	228	181	116	212	255	225	86	104	212	81	0	0	156	86	0
13	0	0	0	182	253	243	117	81	194	134	0	0	116	117	13	54	219	233	166
14	0	0	0	70	163	182	13	0	70	152	27	22	181	243	182	168	241	248	117
15	0	0	0	0	32	168	54	0	132	248	202	155	228	253	163	32	83	187	32
16	0	0	0	0	83	241	219	156	209	253	204	48	57	182	70	0	0	0	0
17	0	0	0	0	187	248	233	86	40	155	120	0	0	0	0	0	0	0	0
18	0	0	0	0	32	117	166	0	0	0	0	0	0	0	0	0	0	0	0

FIG. 6b

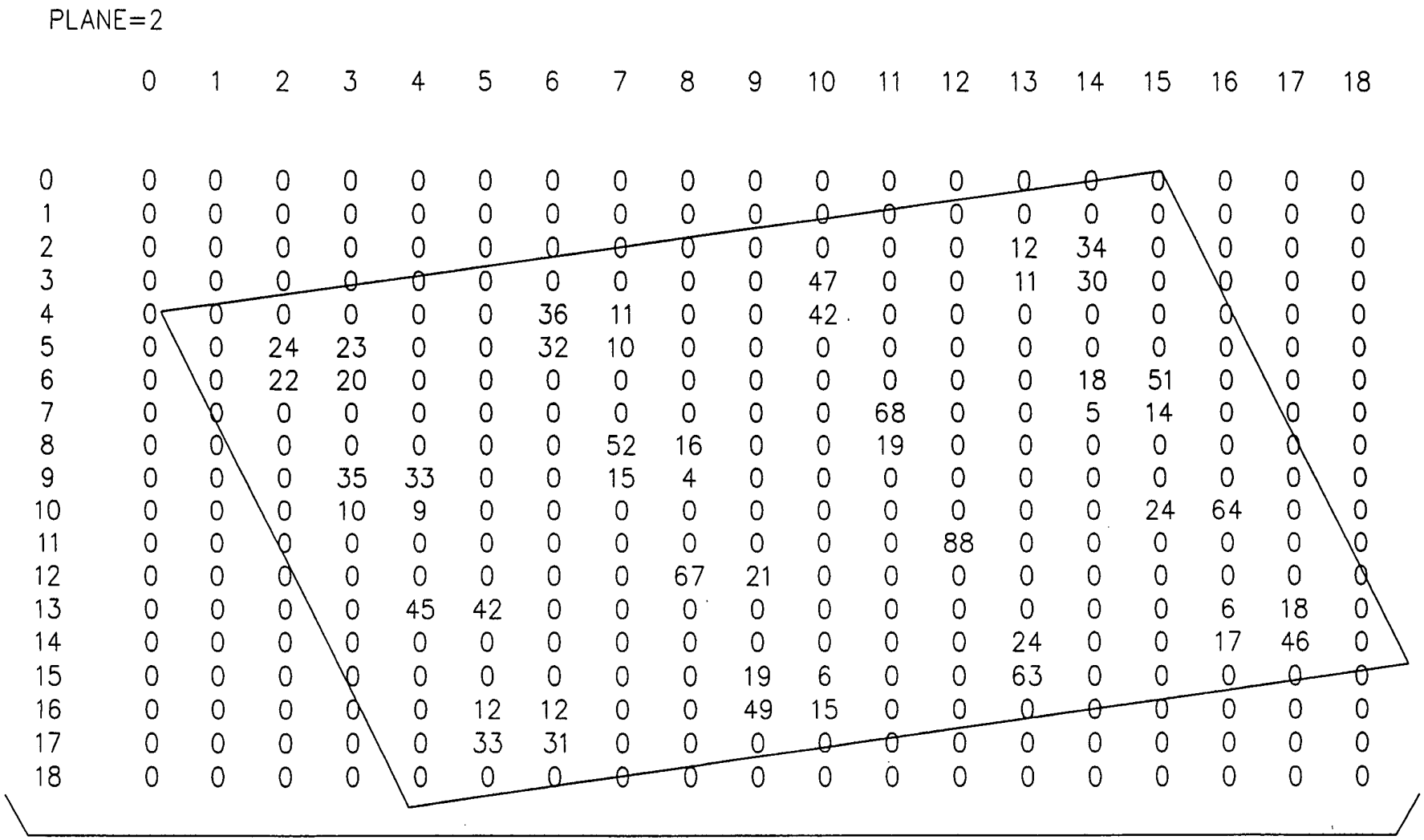

PLANE=2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2 0 0 0 0 0 0 0 0 0 0 0 0 0 12 34 0 0 0 0
3 0 0 0 0 0 0 0 0 0 0 47 0 0 11 30 0 0 0 0
4 0 0 0 0 0 0 36 11 0 0 42 0 0 0 0 0 0 0 0
5 0 0 24 23 0 0 32 10 0 0 0 0 0 0 0 0 0 0 0
6 0 0 22 20 0 0 0 0 0 0 0 0 0 0 18 51 0 0 0
7 0 0 0 0 0 0 0 0 0 0 0 68 0 0 5 14 0 0 0
8 0 0 0 0 0 0 0 52 16 0 0 19 0 0 0 0 0 0 0
9 0 0 0 35 33 0 0 15 4 0 0 0 0 0 0 0 0 0 0
10 0 0 0 10 9 0 0 0 0 0 0 0 0 0 0 24 64 0 0
11 0 0 0 0 0 0 0 0 0 0 0 0 88 0 0 0 0 0 0
12 0 0 0 0 0 0 0 0 67 21 0 0 0 0 0 0 0 0 0
13 0 0 0 0 45 42 0 0 0 0 0 0 0 0 0 0 6 18 0
14 0 0 0 0 0 0 0 0 0 0 0 0 0 24 0 0 17 46 0
15 0 0 0 0 0 0 0 0 0 19 6 0 0 63 0 0 0 0 0
16 0 0 0 0 0 12 12 0 0 49 15 0 0 0 0 0 0 0 0
17 0 0 0 0 0 33 31 0 0 0 0 0 0 0 0 0 0 0 0
18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

FIG. 6c

PLANE=255

255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255

FIG. 7a

PLANE=128

0	0	0	0	0	0	81	20	0	1	35	0	0	0	0	0	0	0	1	1	0	0	101	24	0	0	3
0	0	0	0	0	0	0	17	16	0	0	82	21	0	0	0	0	0	0	0	0	0	0	35	32	0	0
53	16	0	0	0	0	0	0	0	0	0	0	52	48	0	0	24	5	0	0	0	0	0	0	0	1	0
0	68	57	0	0	2	1	0	0	0	0	0	0	6	21	0	0	54	50	0	0	0	0	0	0	0	0
0	0	18	49	0	0	36	34	0	0	0	0	0	0	0	0	0	0	24	70	0	0	18	17	0	0	0
0	0	0	0	2	0	0	35	96	0	0	2	2	0	0	0	0	0	0	1	32	0	0	25	73	0	0
0	0	0	0	0	0	0	0	1	65	0	0	18	51	0	0	0	0	0	0	0	0	0	0	2	98	0
0	6	23	0	0	0	0	0	0	0	1	0	0	3	128	0	0	1	2	0	0	0	0	0	0	0	22
4	0	2	101	0	0	0	0	0	0	0	0	0	0	0	51	9	0	1	68	0	0	0	0	0		

FIG. 7b

PLANE=2

0	0	0	0	0	0	51	14	0	1	23	0	0	0	0	0	0	0	1	1	0	0	65	18	0	0	3
0	0	0	0	0	0	0	11	10	0	0	52	15	0	0	0	0	0	0	0	0	0	0	23	20	0	0
35	10	0	0	0	0	0	0	0	0	0	0	34	30	0	0	18	5	0	0	0	0	0	0	0	1	0
0	44	39	0	0	2	1	0	0	0	0	0	0	6	15	0	0	36	32	0	0	0	0	0	0	0	0
0	0	12	31	0	0	24	22	0	0	0	0	0	0	0	0	0	0	18	46	0	0	12	11	0	0	0
0	0	0	0	2	0	0	23	60	0	0	2	2	0	0	0	0	0	0	1	20	0	0	19	49	0	0
0	0	0	0	0	0	0	0	1	41	0	0	12	33	0	0	0	0	0	0	0	0	0	0	2	62	0
0	6	17	0	0	0	0	0	0	0	1	0	0	3	80	0	0	1	2	0	0	0	0	0	0	0	16
4	0	2	65	0	0	0	0	0	0	0	0	0	0	0	33	9	0	1	44	0	0	0	0	0		

FIG. 7c

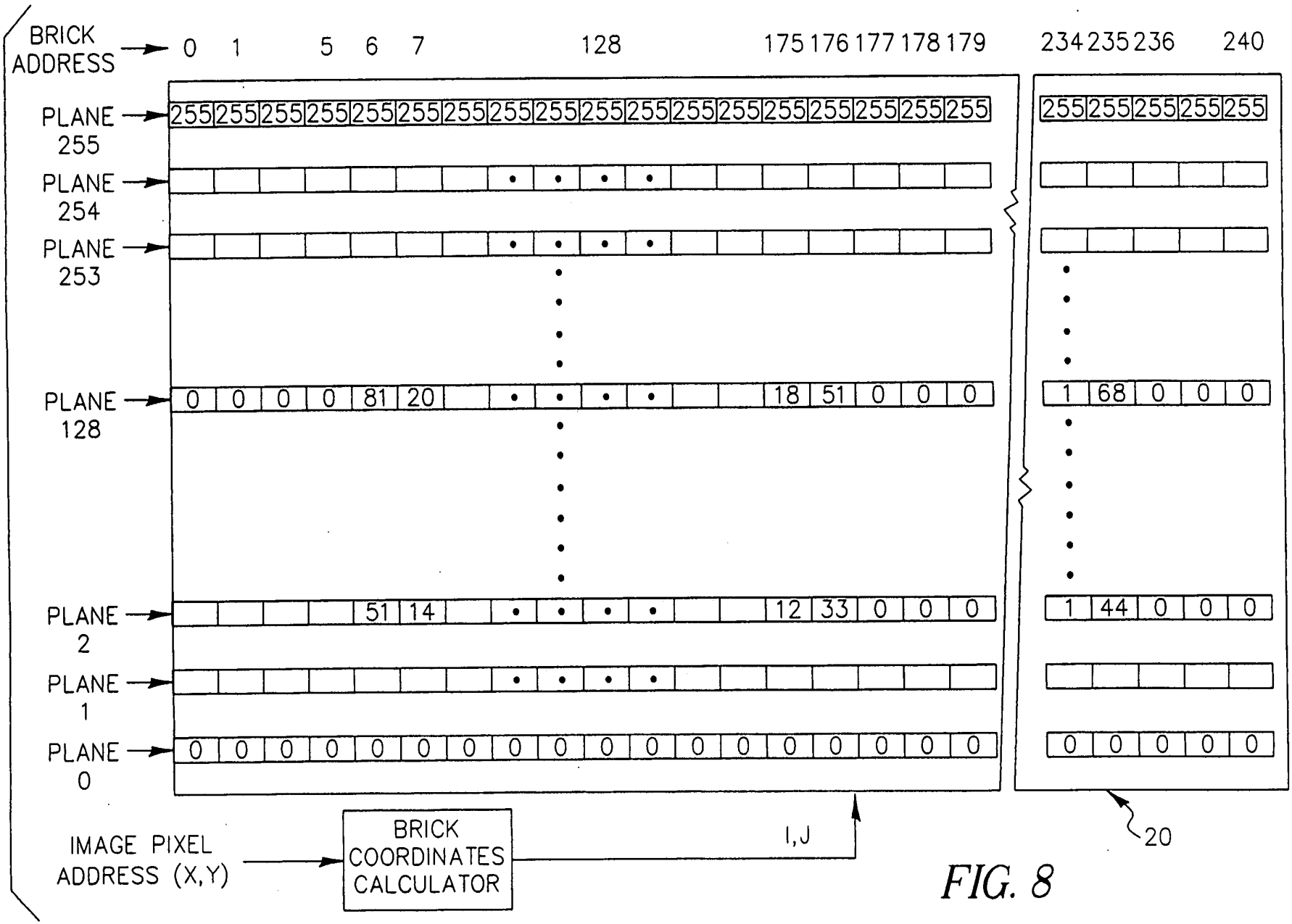

BRICK ADDRESS
0 1 5 6 7 128 175 176 177 178 179 234 235 236 240
PLANE 255
PLANE 254
PLANE 253
PLANE 128
PLANE 2
PLANE 1
PLANE 0
255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255
0 0 0 0 81 20 18 51 0 0 0
1 68 0 0 0
51 14 12 33 0 0 0
1 44 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
20
IMAGE PIXEL ADDRESS (X,Y)
BRICK COORDINATES CALCULATOR
I,J

FIG. 8

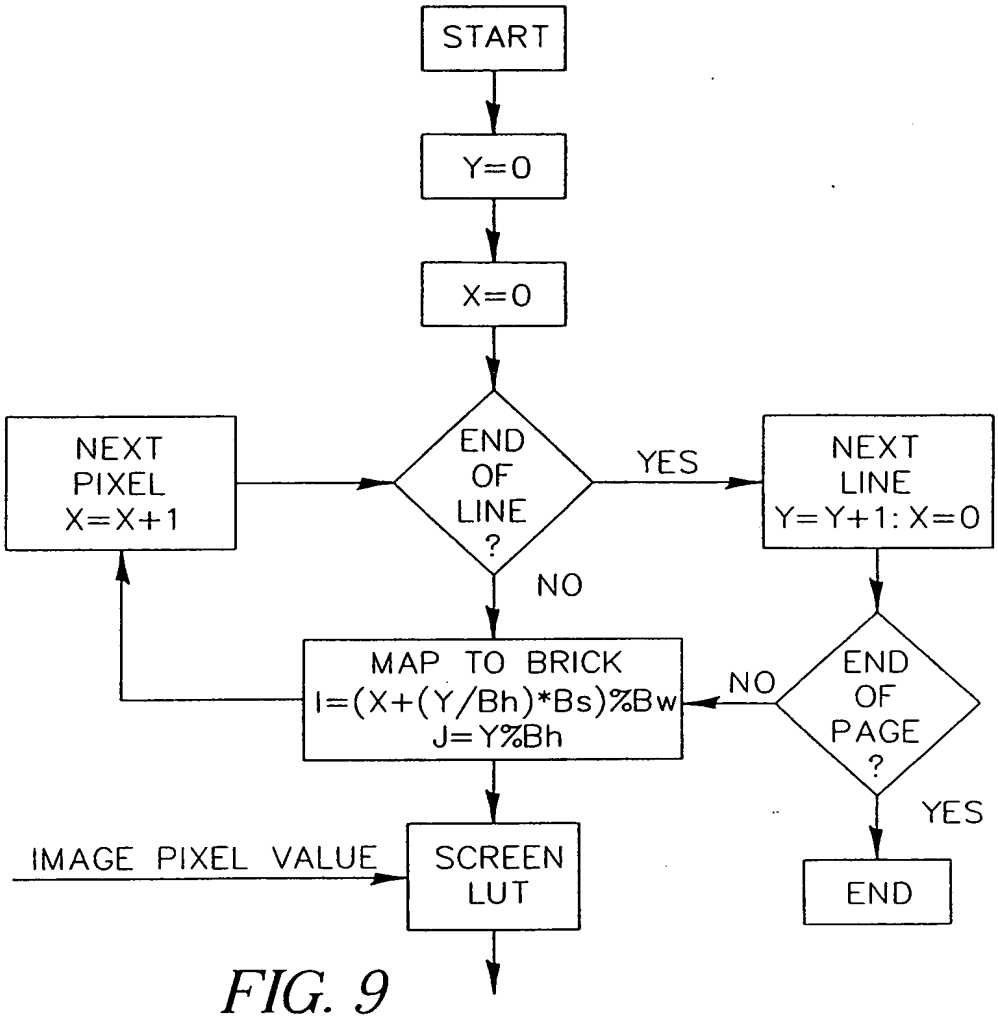


FIG. 9

PLANE 255

255	255
255	255

PLANE 128

127	128
128	128

PLANE 2

1	2
2	2

FIG. 10

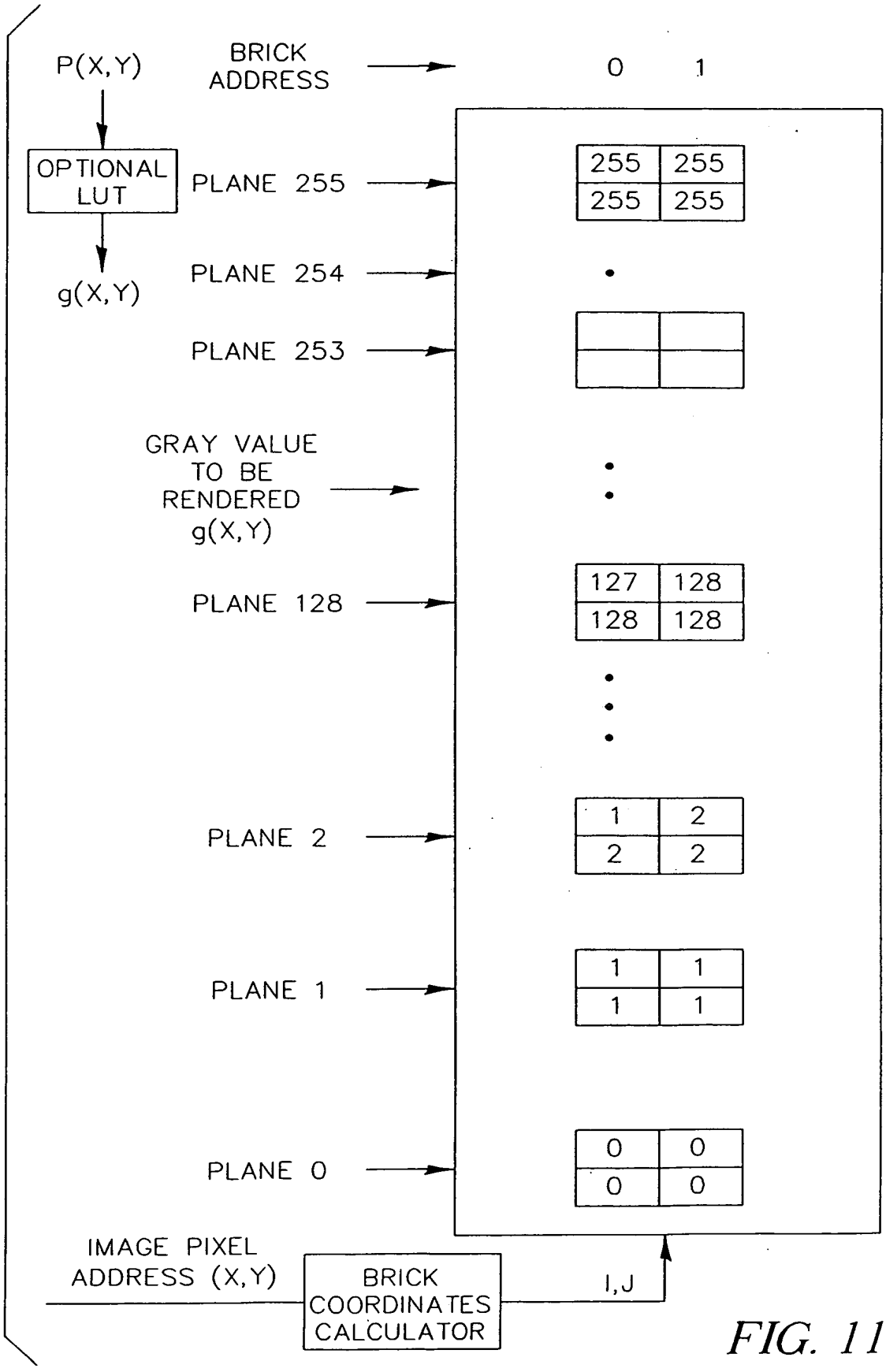

P(X,Y)
OPTIONAL LUT
g(X,Y)
BRICK ADDRESS
0 1
PLANE 255
PLANE 254
PLANE 253
GRAY VALUE TO BE RENDERED g(X,Y)
PLANE 128
PLANE 2
PLANE 1
PLANE 0
255 255
255 255
127 128
128 128
1 2
2 2
1 1
1 1
0 0
0 0
IMAGE PIXEL ADDRESS (X,Y)
BRICK COORDINATES CALCULATOR
I,J

FIG. 11

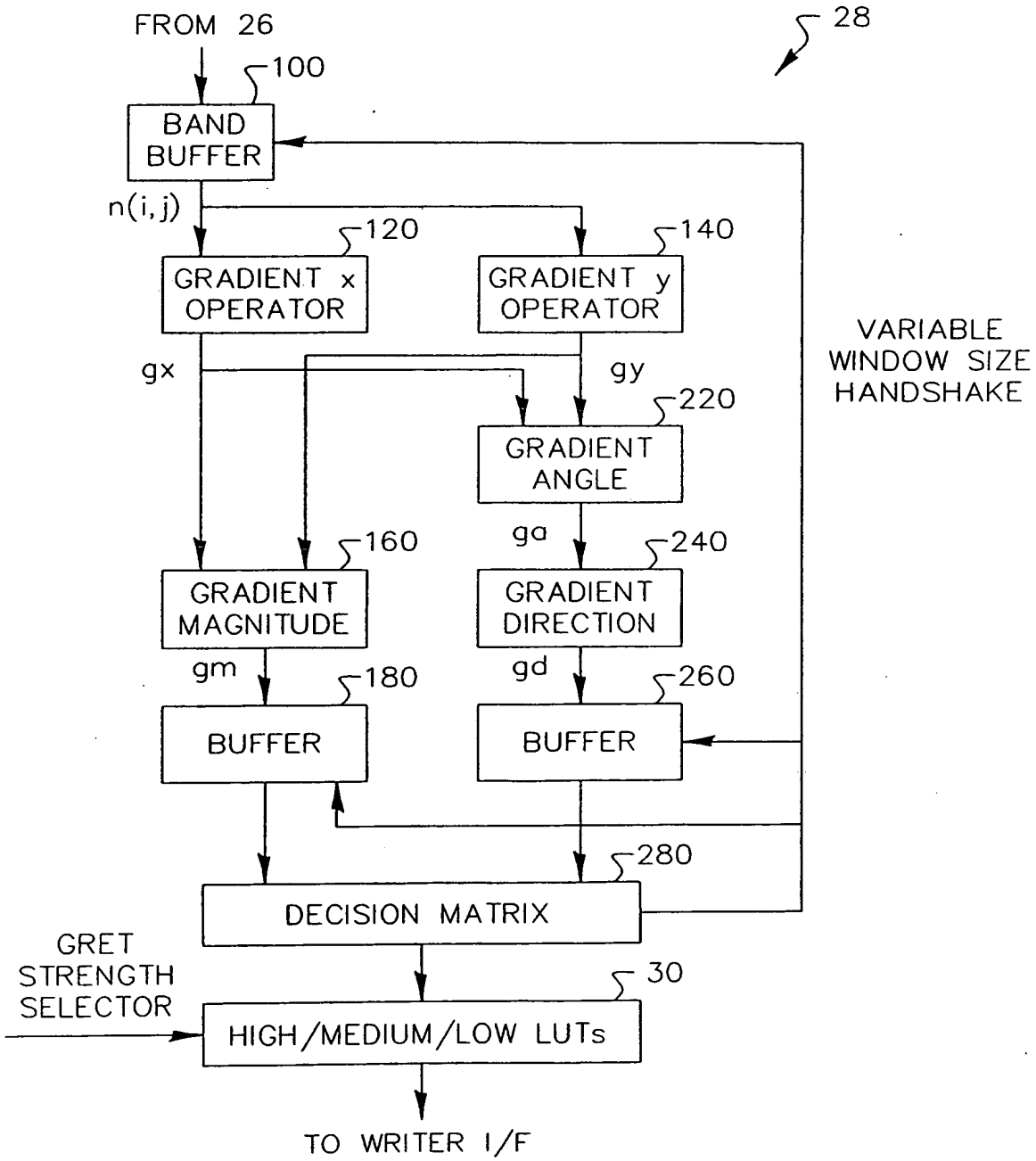

FROM 26
28
100
BAND BUFFER
n(i,j)
120
GRADIENT x OPERATOR
140
GRADIENT y OPERATOR
VARIABLE WINDOW SIZE HANDSHAKE
gx
gy
220
GRADIENT ANGLE
ga
160
GRADIENT MAGNITUDE
240
GRADIENT DIRECTION
gm
180
BUFFER
gd
260
BUFFER
280
DECISION MATRIX
GRET STRENGTH SELECTOR
30
HIGH/MEDIUM/LOW LUTs
TO WRITER I/F

FIG. 12

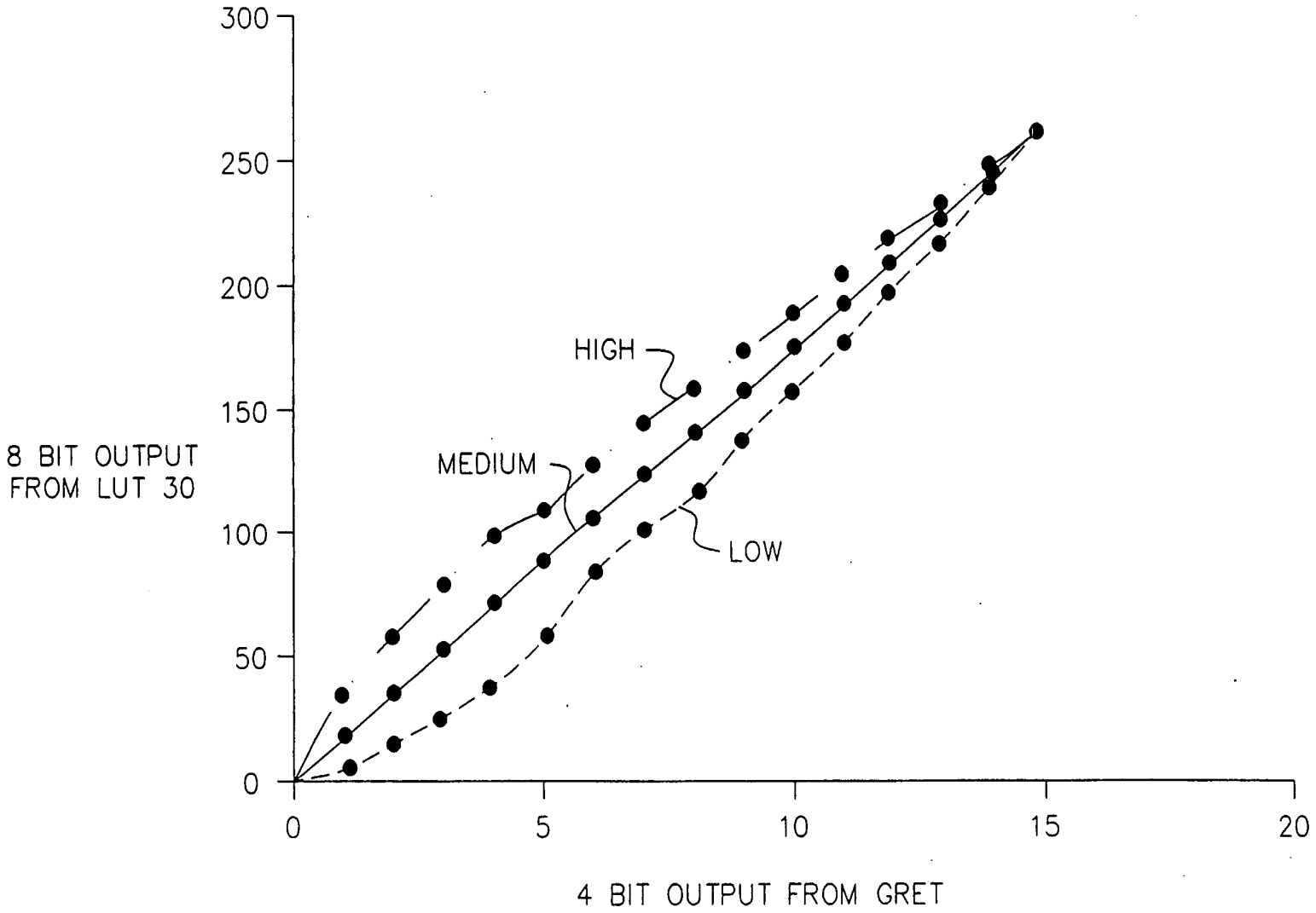
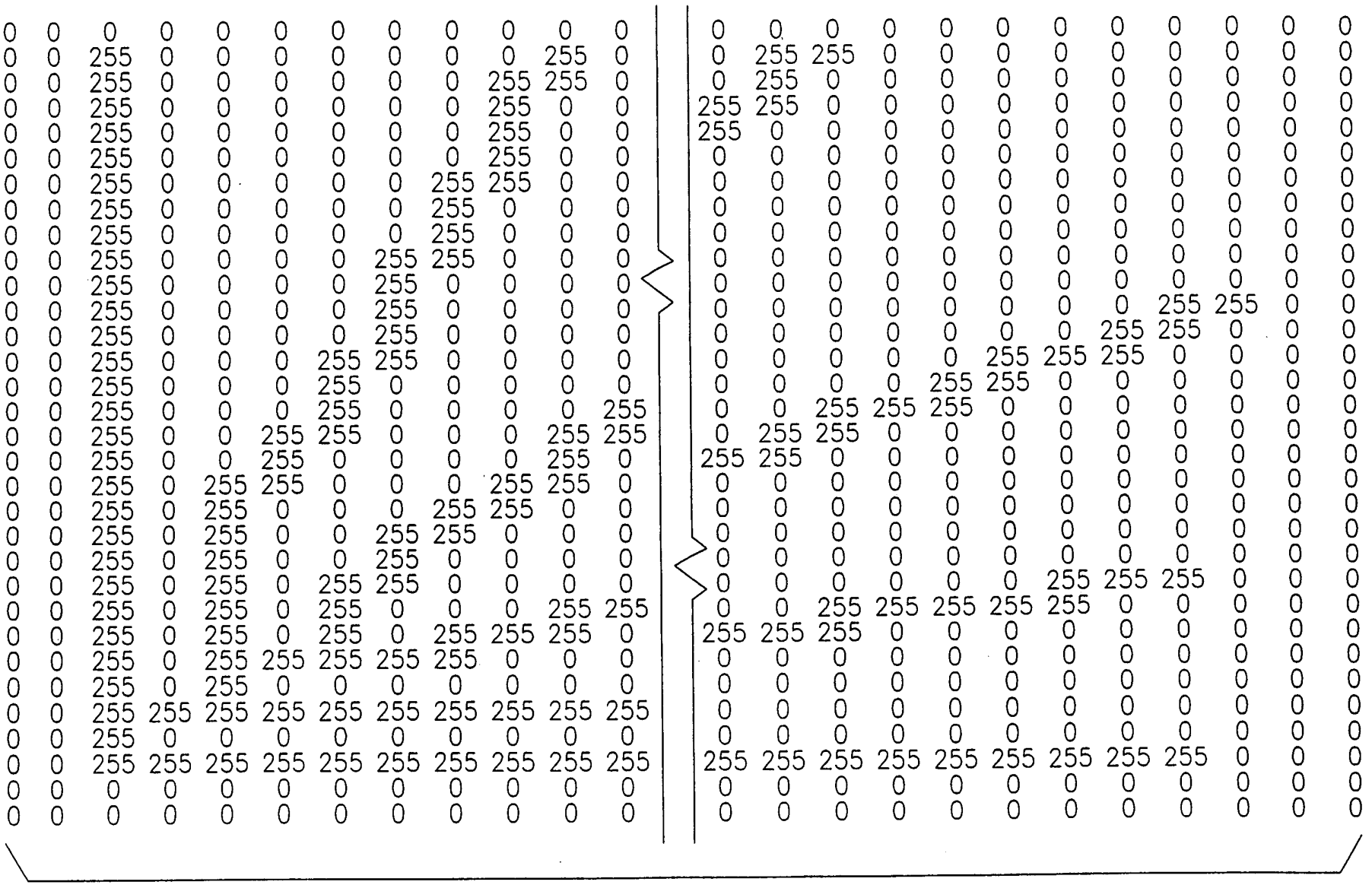

300
250
200
150
100
50
0
8 BIT OUTPUT
FROM LUT 30
HIGH
MEDIUM
LOW
0
5
10
15
20
4 BIT OUTPUT FROM GRET

FIG. 13


0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 0 255 0
0 0 255 0 0 0 0 0 0 255 255 0
0 0 255 0 0 0 0 0 0 255 0 0
0 0 255 0 0 0 0 0 0 255 0 0
0 0 255 0 0 0 0 0 0 255 0 0
0 0 255 0 0 0 0 0 255 255 0 0
0 0 255 0 0 0 0 0 255 0 0 0
0 0 255 0 0 0 0 0 255 0 0 0
0 0 255 0 0 0 0 255 255 0 0 0
0 0 255 0 0 0 0 255 0 0 0 0
0 0 255 0 0 0 0 255 0 0 0 0
0 0 255 0 0 0 0 255 0 0 0 0
0 0 255 0 0 0 255 255 0 0 0 0
0 0 255 0 0 0 255 0 0 0 0 0
0 0 255 0 0 0 255 0 0 0 0 0
0 0 255 0 0 0 255 0 0 0 0 0
0 0 255 0 0 0 255 255 0 0 0 0
0 0 255 0 0 255 255 0 0 0 0 0
0 0 255 0 0 255 0 0 0 0 0 255
0 0 255 0 0 255 255 0 0 0 255 255
0 0 255 0 0 255 0 0 0 0 255 0
0 0 255 0 255 255 0 0 0 255 255 0
0 0 255 0 255 0 0 0 255 255 0 0
0 0 255 0 255 0 0 255 255 0 0 0
0 0 255 0 255 0 0 255 0 0 0 0
0 0 255 0 255 0 255 255 0 0 0 0
0 0 255 0 255 0 255 0 0 0 255 255
0 0 255 0 255 0 255 0 255 255 255 0
0 0 255 0 255 255 255 255 255 0 0 0
0 0 255 0 255 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255
0 0 255 0 0 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 255 255 0 0 0 0 0 0 0 0 0
0 255 0 0 0 0 0 0 0 0 0 0
255 255 0 0 0 0 0 0 0 0 0 0
255 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0

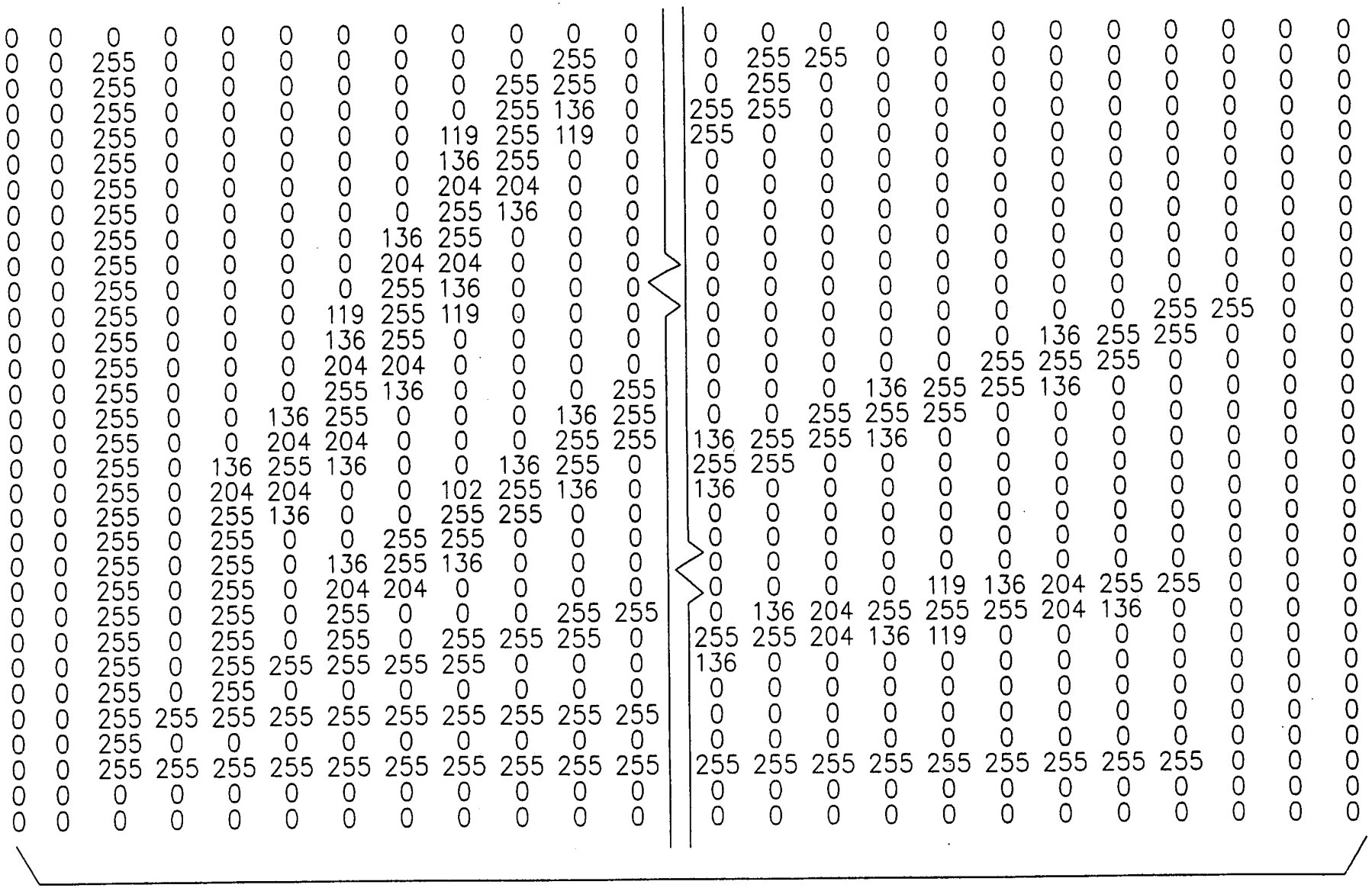

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 0 255 0 0 255 255 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 255 255 0 0 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 255 136 0 255 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 119 255 119 0 255 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 136 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 204 204 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 255 136 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 136 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 204 204 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 255 136 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 119 255 119 0 0 0 0 0 0 0 0 0 0 0 255 255 0 0
0 0 255 0 0 0 136 255 0 0 0 0 0 0 0 0 0 0 136 255 255 0 0 0
0 0 255 0 0 0 204 204 0 0 0 0 0 0 0 0 0 255 255 255 0 0 0 0
0 0 255 0 0 0 255 136 0 0 0 255 0 0 0 136 255 255 136 0 0 0 0 0
0 0 255 0 0 136 255 0 0 0 136 255 0 0 255 255 255 0 0 0 0 0 0 0
0 0 255 0 0 204 204 0 0 0 255 255 136 255 255 136 0 0 0 0 0 0 0 0
0 0 255 0 136 255 136 0 0 136 255 0 255 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 204 204 0 0 102 255 136 0 136 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 136 0 0 255 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 0 255 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 136 255 136 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 204 204 0 0 0 0 0 0 0 0 119 136 204 255 255 0 0 0
0 0 255 0 255 0 255 0 0 0 255 255 0 136 204 255 255 255 204 136 0 0 0 0
0 0 255 0 255 0 255 0 255 255 255 0 255 255 204 136 119 0 0 0 0 0 0 0
0 0 255 0 255 255 255 255 255 0 0 0 136 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

FIG. 15

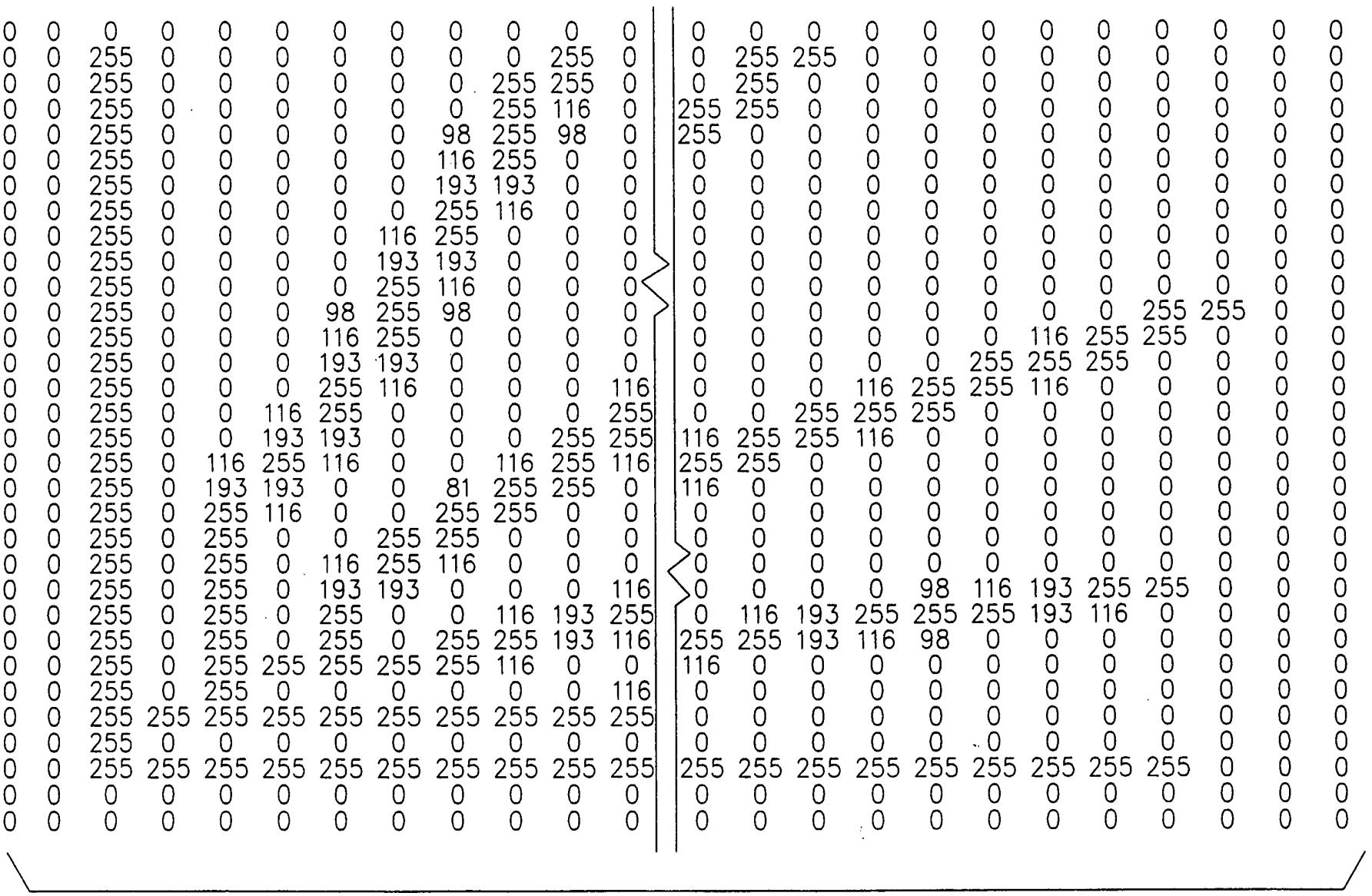

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 0 255 0 0 255 255 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 255 255 0 0 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 255 116 0 255 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 98 255 98 0 255 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 116 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 193 193 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 255 116 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 116 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 193 193 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 255 116 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 98 255 98 0 0 0 0 0 0 0 0 0 0 0 255 255 0 0
0 0 255 0 0 0 116 255 0 0 0 0 0 0 0 0 0 0 116 255 255 0 0 0
0 0 255 0 0 0 193 193 0 0 0 0 0 0 0 0 0 255 255 255 0 0 0 0
0 0 255 0 0 0 255 116 0 0 0 116 0 0 0 116 255 255 116 0 0 0 0 0
0 0 255 0 0 116 255 0 0 0 0 255 0 0 255 255 255 0 0 0 0 0 0 0
0 0 255 0 0 193 193 0 0 0 255 255 116 255 255 116 0 0 0 0 0 0 0 0
0 0 255 0 116 255 116 0 0 116 255 116 255 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 193 193 0 0 81 255 255 0 116 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 116 0 0 255 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 0 255 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 116 255 116 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 193 193 0 0 0 116 0 0 0 0 98 116 193 255 255 0 0 0
0 0 255 0 255 0 255 0 0 116 193 255 0 116 193 255 255 255 193 116 0 0 0 0
0 0 255 0 255 0 255 0 255 255 193 116 255 255 193 116 98 0 0 0 0 0 0 0
0 0 255 0 255 255 255 255 255 116 0 0 116 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 0 0 0 0 0 116 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

FIG. 16

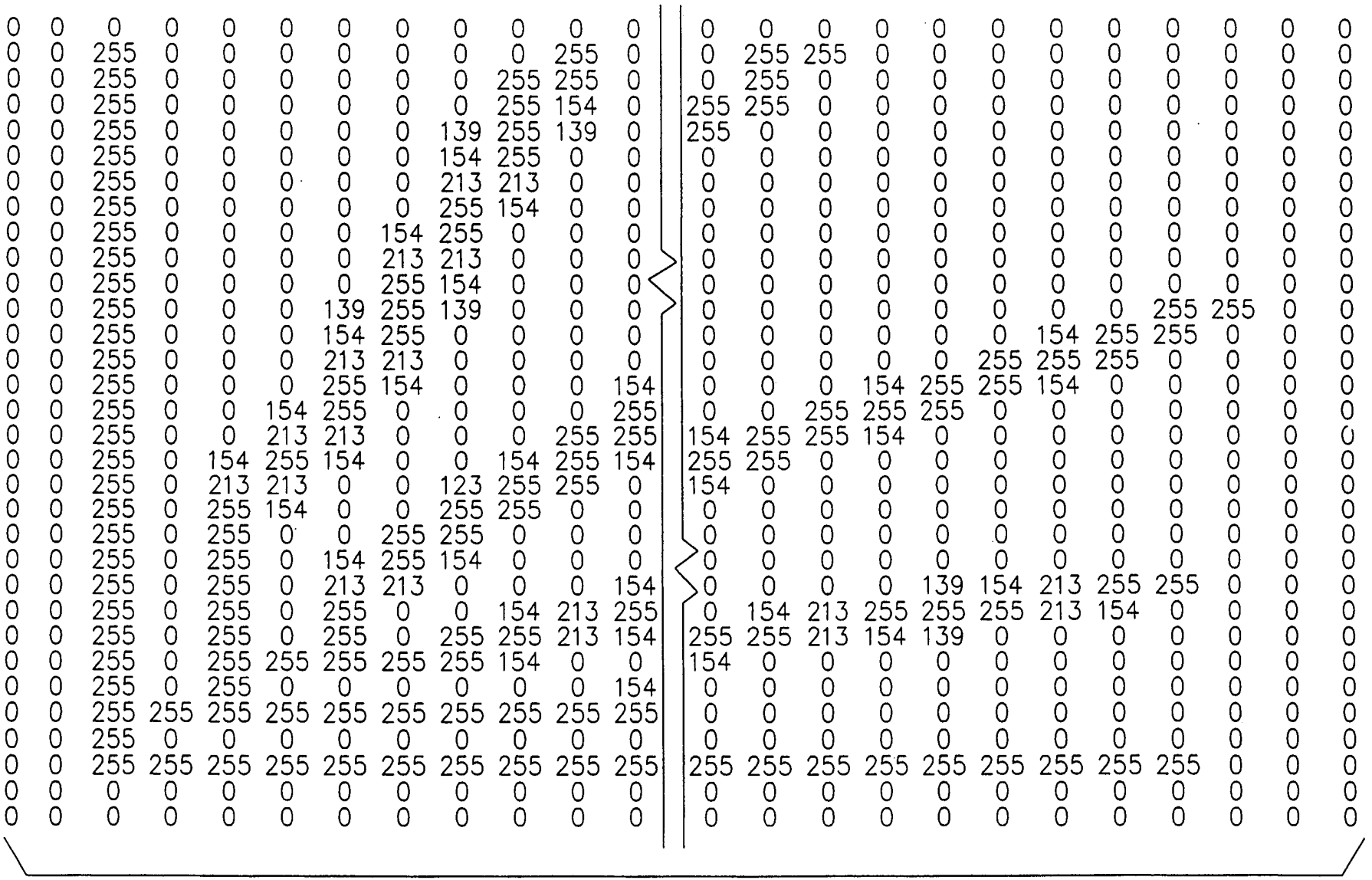

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 0 255 0 0 255 255 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 255 255 0 0 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 255 154 0 255 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 139 255 139 0 255 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 154 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 213 213 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 255 154 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 154 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 213 213 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 255 154 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 139 255 139 0 0 0 0 0 0 0 0 0 0 0 255 255 0 0
0 0 255 0 0 0 154 255 0 0 0 0 0 0 0 0 0 0 154 255 255 0 0 0
0 0 255 0 0 0 213 213 0 0 0 0 0 0 0 0 0 255 255 255 0 0 0 0
0 0 255 0 0 0 255 154 0 0 0 154 0 0 0 154 255 255 154 0 0 0 0 0
0 0 255 0 0 154 255 0 0 0 0 255 0 0 255 255 255 0 0 0 0 0 0 0
0 0 255 0 0 213 213 0 0 0 255 255 154 255 255 154 0 0 0 0 0 0 0 0
0 0 255 0 154 255 154 0 0 154 255 154 255 255 0 0 0 0 0 0 0 0 0 0
0 0 255 0 213 213 0 0 123 255 255 0 154 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 154 0 0 255 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 0 255 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 154 255 154 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 213 213 0 0 0 154 0 0 0 0 139 154 213 255 255 0 0 0
0 0 255 0 255 0 255 0 0 154 213 255 0 154 213 255 255 255 213 154 0 0 0 0
0 0 255 0 255 0 255 0 255 255 213 154 255 255 213 154 139 0 0 0 0 0 0 0
0 0 255 0 255 255 255 255 255 154 0 0 154 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 255 0 0 0 0 0 0 154 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 255 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

FIG. 17

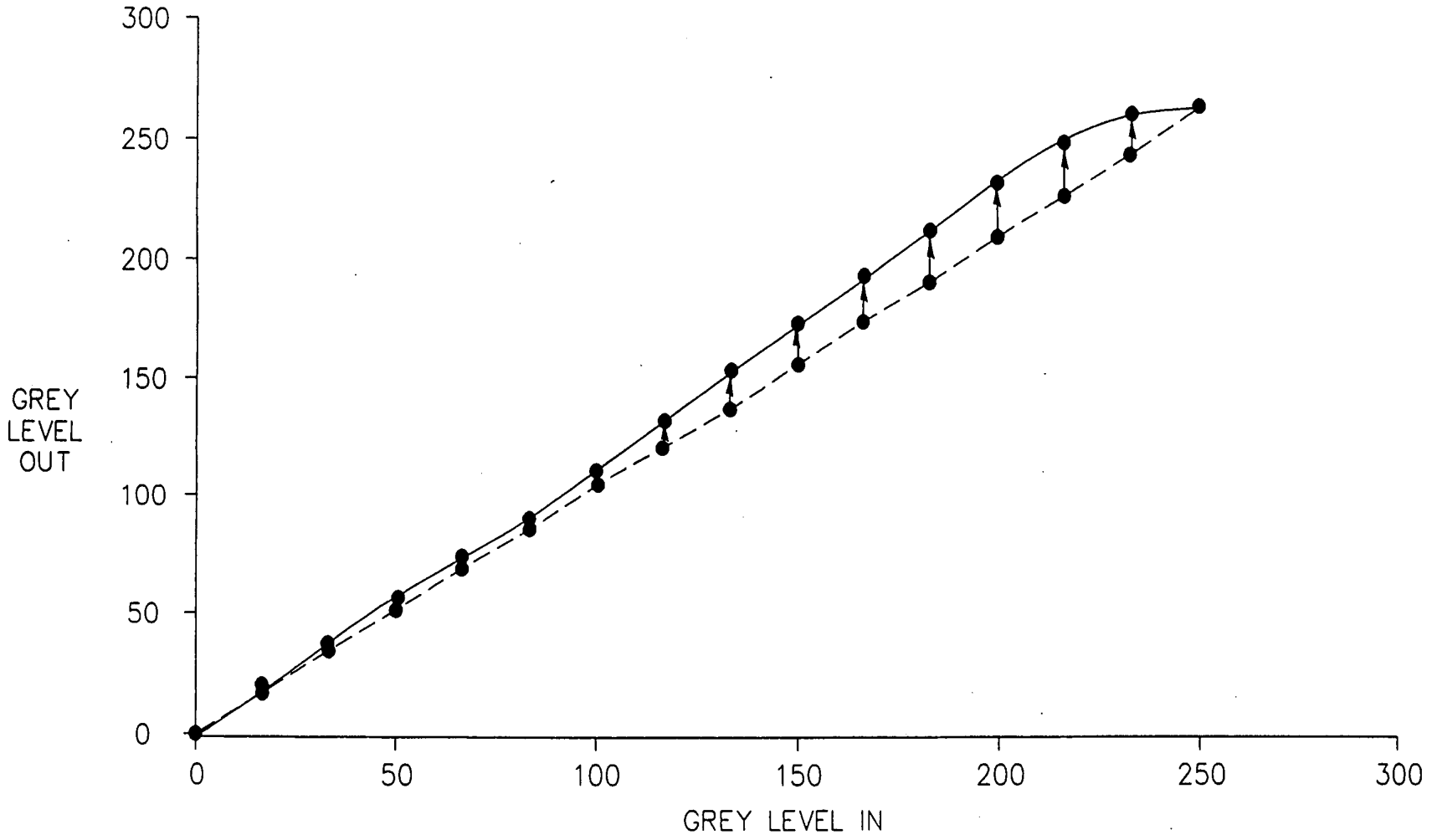

300
250
200
150
100
50
0
GREY
LEVEL
OUT
0
50
100
150
200
250
300
GREY LEVEL IN

FIG. 18

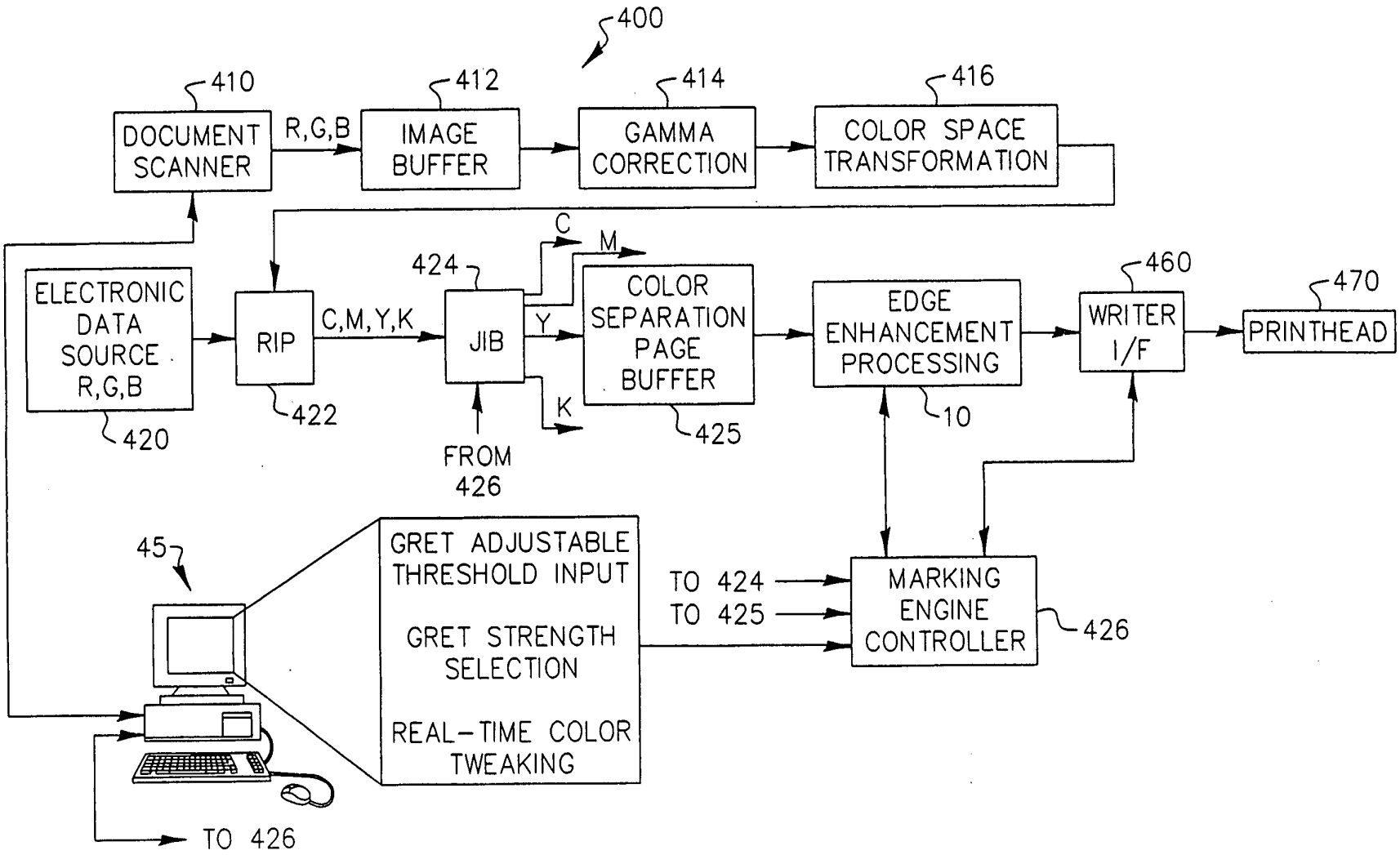

400
410
DOCUMENT SCANNER
R,G,B
412
IMAGE BUFFER
414
GAMMA CORRECTION
416
COLOR SPACE TRANSFORMATION
ELECTRONIC DATA SOURCE R,G,B
420
RIP
422
C,M,Y,K
424
JIB
C
M
Y
K
FROM 426
COLOR SEPARATION PAGE BUFFER
425
EDGE ENHANCEMENT PROCESSING
10
460
WRITER I/F
470
PRINTHEAD
45
GRET ADJUSTABLE THRESHOLD INPUT
GRET STRENGTH SELECTION
REAL-TIME COLOR TWEAKING
TO 424
TO 425
MARKING ENGINE CONTROLLER
426
TO 426

FIG. 19

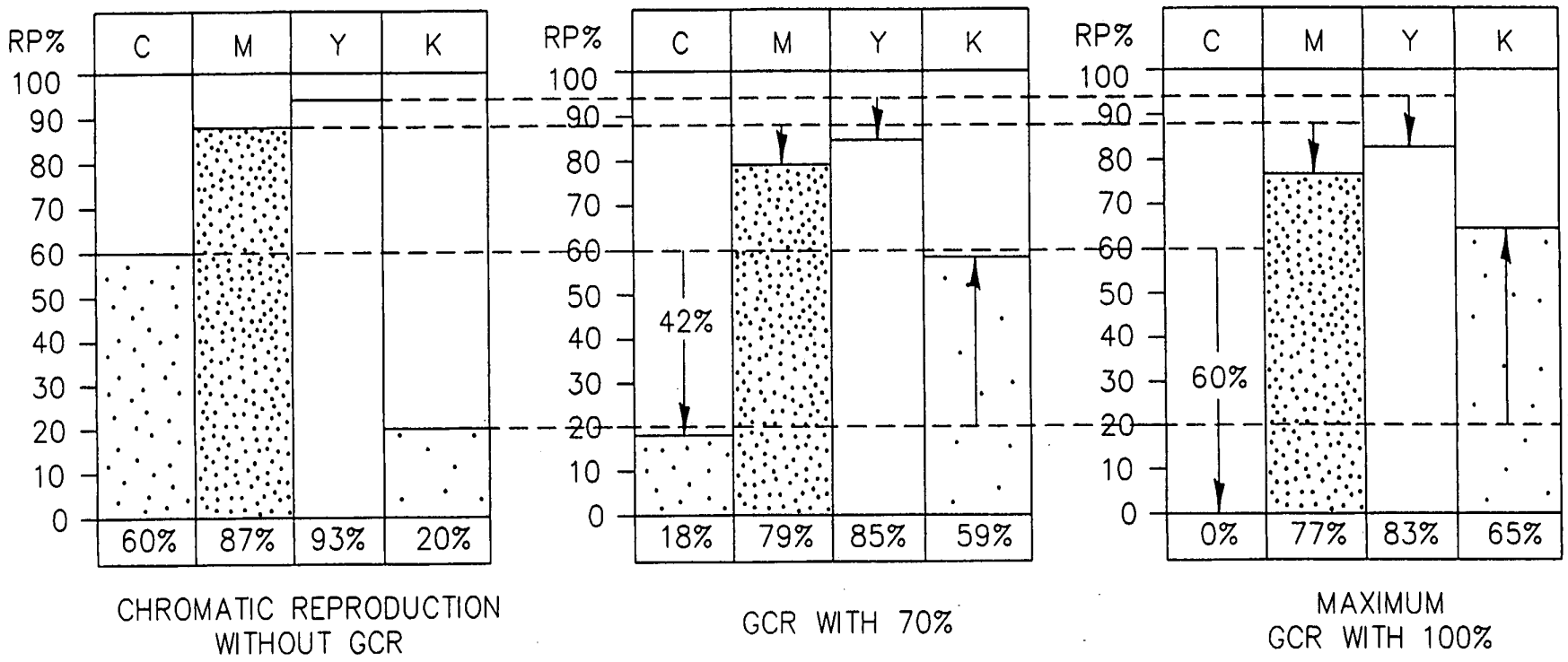

RP%
C
M
Y
K
100
90
80
70
60
50
40
30
20
10
0
60%
87%
93%
20%
CHROMATIC REPRODUCTION
WITHOUT GCR
RP%
C
M
Y
K
42%
18%
79%
85%
59%
GCR WITH 70%
RP%
C
M
Y
K
60%
0%
77%
83%
65%
MAXIMUM
GCR WITH 100%
DOMINANT COLORS: Y,M=RED
COMPLEMENTARY COLOR=CYAN

FIG. 20a

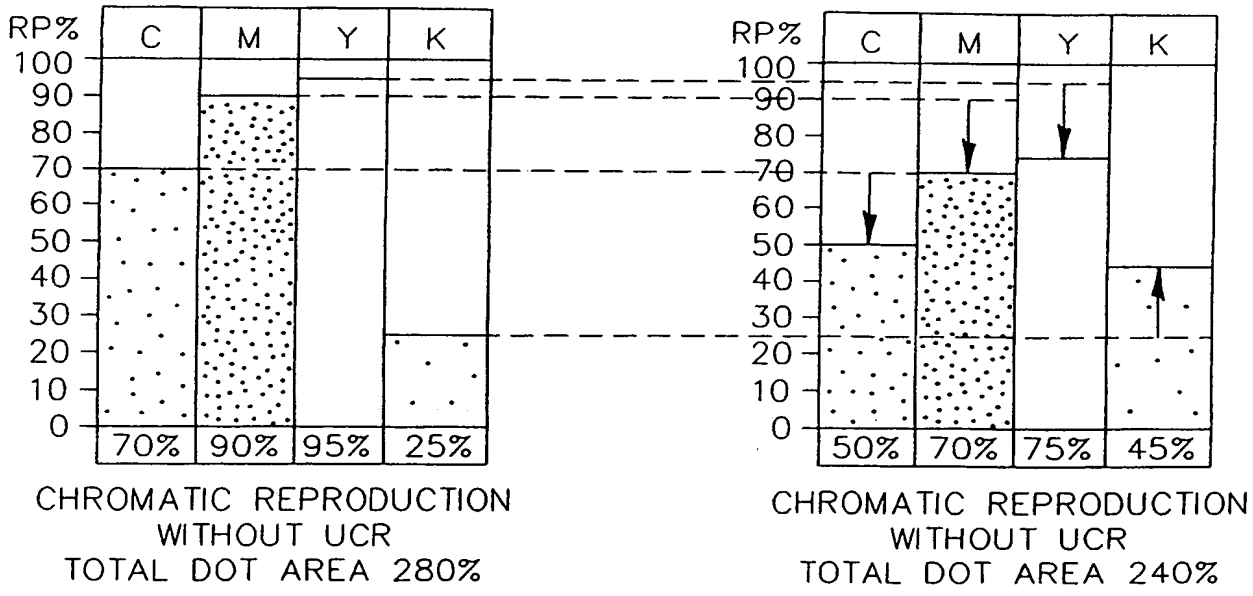

RP%
C
M
Y
K
100
90
80
70
60
50
40
30
20
10
0
70%
90%
95%
25%
CHROMATIC REPRODUCTION
WITHOUT UCR
TOTAL DOT AREA 280%
RP%
C
M
Y
K
50%
70%
75%
45%
CHROMATIC REPRODUCTION
WITHOUT UCR
TOTAL DOT AREA 240%

FIG. 20b

STEP 1

TILE STRUCTURE

X	X	X	X	X	X	X
X	X	X	C1	X	X	X
X	X	C1	C1	C1	X	X
X	C1	C1	C1	C1	C1	X
X	C1	C1	C1	C1	C1	X
X	X	C1	C1	C1	X	X
X	X	X	C1	X	X	X
X	X	X	X	X	X	X

FIG. 21-1

STEP 2

LABEL PIXEL SEQUENCE
IN THE TILE

0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	2	3	4	0	0
0	5	6	7	8	9	0
0	10	11	12	13	14	0
0	0	15	16	17	0	0
0	0	0	18	0	0	0
0	0	0	0	0	0	0

FIG. 21-2

STEP 3

FILL UP IMAGE PLANE WITH TILE

1	10	11	12	13	14	1	10	11	12	13	14	1
3	4	15	16	17	2	3	4	15	16	17	2	3
7	8	9	18	5	6	7	8	9	18	5	6	7
12	13	14	1	10	11	12	13	14	1	10	11	12
16	17	2	3	4	15	16	17	2	3	4	15	16
18	5	6	7	8	9	18	5	6	7	8	9	18
1	10	11	12	13	14	1	10	11	12	13	14	1
3	4	15	16	17	2	3	4	15	16	17	2	3
7	8	9	18	5	6	7	8	9	18	5	6	7
12	13	14	1	10	11	12	13	14	1	10	11	12
16	17	2	3	4	15	16	17	2	3	4	15	16
18	5	6	7	8	9	18	5	6	7	8	9	18
1	10	11	12	13	14	1	10	11	12	13	14	1
3	4	15	16	17	2	3	4	15	16	17	2	3
7	8	9	18	5	6	7	8	9	18	5	6	7
12	13	14	1	10	11	12	13	14	1	10	11	12
16	17	2	3	4	15	16	17	2	3	4	15	16

FIG. 21-3

STEP 4

FOUND REPEATING RECTANGLE BLOCKS IN THE IMAGE PLANE

1	10	11	12	13	14	1	10	11	12	13	14	1
3	4	15	16	17	2	3	4	15	16	17	2	3
7	8	9	18	5	6	7	8	9	18	5	6	7
12	13	14	1	10	11	12	13	14	1	10	11	12
16	17	2	3	4	15	16	17	2	3	4	15	16
18	5	6	7	8	9	18	5	6	7	8	9	18
1	10	11	12	13	14	1	10	11	12	13	14	1
3	4	15	16	17	2	3	4	15	16	17	2	3
7	8	9	18	5	6	7	8	9	18	5	6	7
12	13	14	1	10	11	12	13	14	1	10	11	12
16	17	2	3	4	15	16	17	2	3	4	15	16
18	5	6	7	8	9	18	5	6	7	8	9	18
1	10	11	12	13	14	1	10	11	12	13	14	1
3	4	15	16	17	2	3	4	15	16	17	2	3
7	8	9	18	5	6	7	8	9	18	5	6	7
12	13	14	1	10	11	12	13	14	1	10	11	12
16	17	2	3	4	15	16	17	2	3	4	15	16

FIG. 21-4

STEP 5

BRICK WIDTH=6=Bw
BRICK HEIGHT=3=Bh
BRICK OFFSET=3=Bs

BRICK STRUCTURE FORMED

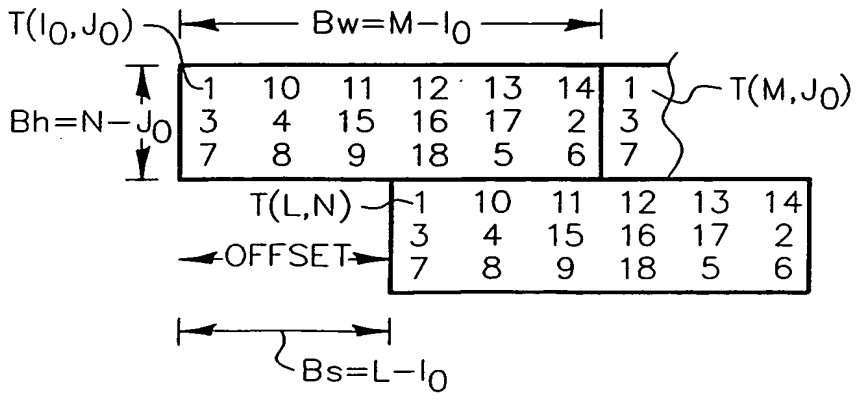


FIG. 21-5

STEP 6

CONVERTS 3-D LUT TILE STRUCTURE TO 3-D LUT BRICK STRUCTURE

LEVEL 0

LEVEL 2

106	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

LEVEL 128

255	231	0	0	0	231
255	231	0	0	0	231
220	99	99	220	100	100

LEVEL 255

255	255	255	255	255	255
255	255	255	255	255	255
255	255	255	255	255	255

FIG. 21-6

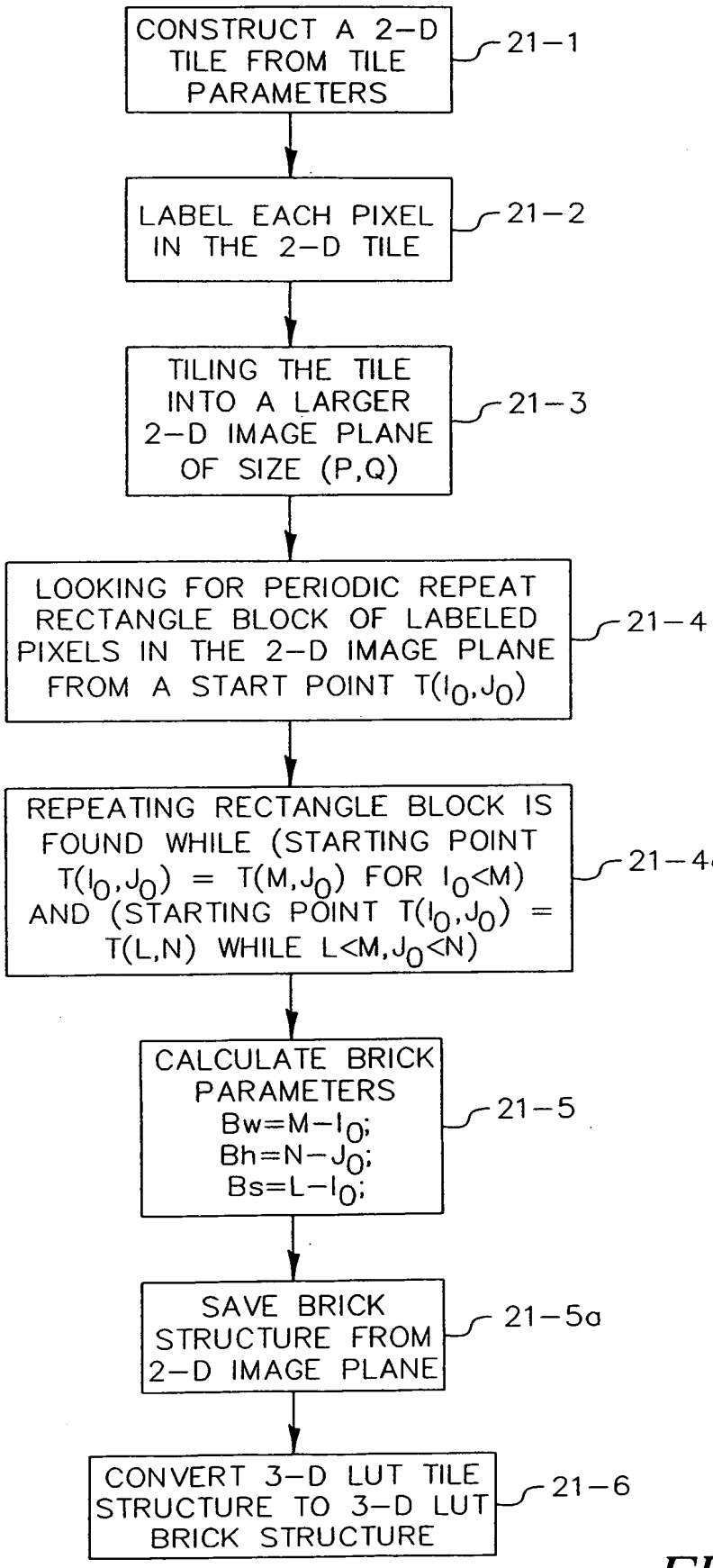

CONSTRUCT A 2-D TILE FROM TILE PARAMETERS
21-1
LABEL EACH PIXEL IN THE 2-D TILE
21-2
TILING THE TILE INTO A LARGER 2-D IMAGE PLANE OF SIZE (P,Q)
21-3
LOOKING FOR PERIODIC REPEAT RECTANGLE BLOCK OF LABELED PIXELS IN THE 2-D IMAGE PLANE FROM A START POINT T(I0,J0)
21-4
REPEATING RECTANGLE BLOCK IS FOUND WHILE (STARTING POINT T(I0,J0) = T(M,J0) FOR I0<M) AND (STARTING POINT T(I0,J0) = T(L,N) WHILE L<M,J0<N)
21-4a
CALCULATE BRICK PARAMETERS Bw=M-I0; Bh=N-J0; Bs=L-I0;
21-5
SAVE BRICK STRUCTURE FROM 2-D IMAGE PLANE
21-5a
CONVERT 3-D LUT TILE STRUCTURE TO 3-D LUT BRICK STRUCTURE
21-6

FIG. 22

GRAY LEVEL = 2

C1	C1	C1	C1	C2	C2	C2
C1	C1	C1	C1	C2	C2	C2
C1	C1	C1	C1	C2	C2	C2
C3	C3	C3	C4	C2	C2	C2
C3	C3	C3	C4	C4	C4	C4
C3	C3	C3	C4	C4	C4	C4
C3	C3	C3	C4	C4	C4	C4

S1	E1	S1	E1
S2	E2	S2	E2
S3	E3	S3	E3
S4	E4	S4	E4
S5	E5	S5	E5
S6	E6	S6	E6
S7	E7	S7	E7
S1	E1	S1	E1
S2	E2	S2	E2
S3	E3	S3	E3
S4	E4	S4	E4
S5	E5	S5	E5
S6	E6	S6	E6
S7	E7	S7	E7

FIG. 23a

GRAY LEVEL = 2

0	0	0	0	0	0	0
0	31	18	0	7	42	0
0	15	8	0	3	20	0
0	0	0	0	0	0	0
0	8	5	0	2	11	0
0	38	21	0	8	51	0
0	0	0	0	0	0	0

BRICK STRUCTURE

0	0	0	0	0	0	0
0	31	18	0	7	42	0
0	15	8	0	3	20	0
0	0	0	0	0	0	0
0	8	5	0	2	11	0
0	38	21	0	8	51	0
0	0	0	0	0	0	0

FIG. 23b

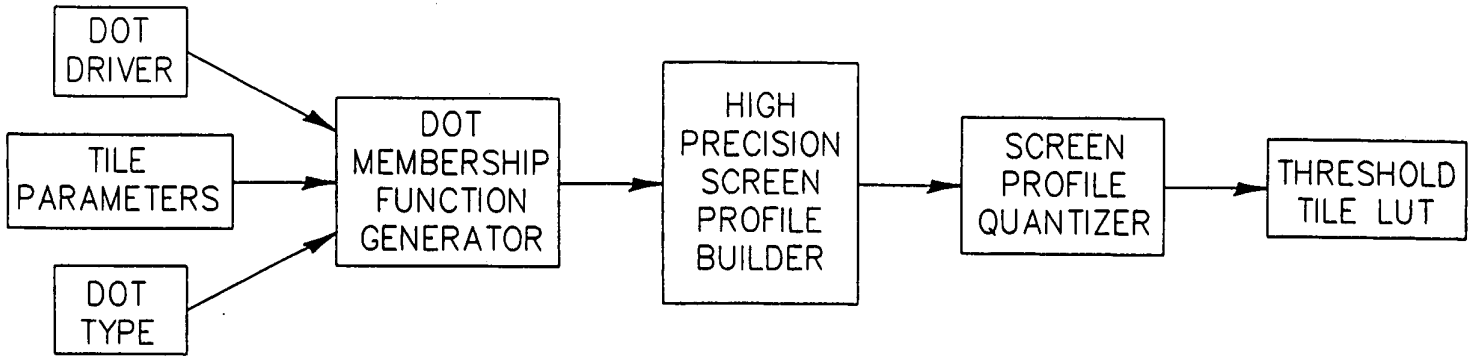
GRAY LEVEL = 128

20	164	83	5	83	164	20
164	255	229	132	223	255	164
83	229	163	51	159	233	83
5	132	51	0	51	132	5
83	223	159	51	158	224	83
164	255	233	132	224	255	164
20	164	83	5	83	164	20

BRICK STRUCTURE

20	164	83	5	83	164	20
164	255	229	132	223	255	164
83	229	163	51	159	233	83
5	132	51	0	51	132	5
83	223	159	51	158	224	83
164	255	233	132	224	255	164
20	164	83	5	83	164	20

FIG. 23c



16X16 DOT SIZE DRIVER

256	245	240	224	204	168	136	92	85	129	161	195	219	233	250	255
252	244	232	208	188	160	116	84	73	109	153	181	209	229	241	248
236	228	216	192	176	144	108	80	69	101	137	169	197	213	225	237
217	212	200	180	152	120	100	63	55	93	121	145	177	189	205	221
193	184	172	148	128	58	46	39	35	51	67	125	149	173	185	201
164	156	140	124	66	42	30	22	19	31	43	59	117	141	157	165
132	112	104	96	50	26	14	6	11	15	27	47	97	105	113	133
88	76	72	54	34	18	10	4	3	8	23	37	61	77	81	89
90	82	78	62	38	24	7	2	1	12	17	33	53	70	74	87
134	114	106	98	48	28	16	9	5	13	25	49	95	103	111	131
166	158	142	118	60	44	32	20	21	29	41	65	123	139	155	163
202	186	174	150	126	68	52	36	40	45	57	127	147	171	183	194
222	206	190	178	146	122	94	56	64	99	119	151	179	199	211	218
238	226	214	198	170	138	102	71	79	107	143	175	191	215	227	235
246	242	230	210	182	154	110	75	83	115	159	187	207	231	243	251
254	249	234	220	196	162	130	86	91	135	167	203	223	239	247	253

FIG. 24